

errors of the elements are of the same order as the perturbations by Jupiter.

These perturbations by Jupiter depend upon the exact circumstances of the approach to Jupiter, and these circumstances in their turn may be largely modified by changes in the elements quite small enough to be consistent with the three months' observations in 1889-90. There is, therefore, great uncertainty as to where comet Spitaler should now be, and also some uncertainty as to what are the true elements of comet 1909e.

Identity is therefore very far from certain. The excuse for putting forward the present conjecture is the interest that naturally turns upon the question of what becomes of the short-period comets that are only once seen.

P. H. COWELL.

Pleochroic Halos.

IN a recent reference to the subject of pleochroic halos (*Phil. Mag.*, February, 1910) I stated that the outer edge of a corona might present an appearance suggesting an actual accentuation or deepening of the coloration, in accordance with the fact observed by Bragg and others that the ionisation of the α ray increased just before the limits of its ionising range was attained. For certain stages of development of the halo, this observation I have more recently confirmed beyond doubt. Like other structural particulars referred to in my paper, this too becomes obliterated by over-exposure. In one case (in the lithia mica of Zinnwald) a stage of development has been found in which the extreme outer border of the corona is the sole visible part of that structure, the appearance presented being that of a detached, very delicate, ring of perfect regularity surrounding the central halo, a space showing no definitely visible ionisation intervening. The outer ring has a radius of 0.0344 mm., and the inner halo a radius of 0.0191 mm. The outer ring is of about normal radial dimensions; the inner radius is that corresponding to under-exposure to the slower moving α particles. Reference to Bragg's curves (*Phil. Mag.*, September, 1905) will more fully explain.

In the granite of Ochsenkopf, Fichtelgebirge, complex halos will be found very beautifully developed. Some of these conform to dimensions such as might be referred to the α radiations of thorium and its derivatives, others to those of the radium family.

The halos described in my paper, referred to above, are for the most part in a lithia-bearing mica, of a kind which is not correctly included among the Muscovites. The emendation does not, however, notably affect the calculations given. The careful observation of the dimensions of pleochroic halos will, I think, be found of service in distinguishing certain micas—the Biotites from the Muscovites, for instance.

J. JOLY.

Trinity College, Dublin, January 31.

Dangerous Lecture Experiments.

THE explosion referred to by Mr. Power in *NATURE* of February 3 (p. 399) was probably due to the presence of a trace of moisture in the reacting substances. I had a similar alarming experience some years ago, using precipitated silica without specially drying it.

Moissan ("Traité de Chimie Minérale," ii., 389), referring to a paper by Ludwig Gattermann (*Ber.*, xxii., 186, 1889), states:—"La réaction ($\text{SiO}_2 + 2\text{Mg} = \text{Si} + 2\text{MgO}$) est si violente, d'après cet auteur, que si l'on emploie la silice précipitée, le tube de verre est entièrement déformé, et une partie de la matière est projetée sous forme d'une gerbe de feu." Winkler (*Ber.*, xxiii., 2652, 1890) found that 0.2 gram of a mixture of magnesium and silica in the above proportions heated in a tube closed at one end caused explosion and shattering of the tube. Vigoroux (*Annales de Chimie et de Physique*, xii., 153, 1897) recognised that the explosion is due to incomplete desiccation of the reacting materials.

Few text-books point out the necessity for ensuring the absence of moisture, although most of them point out that the reaction is very rapid and violent. The only book besides Moissan's "Traité" that I have found to give the warning is by an American, Dr. Benedict ("Chemical Lecture Experiments," The Macmillan Company, New

York, 1901). Dr. Benedict insists upon the absence of moisture, but does not mention any reason.

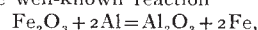
This is not the only case in which dangerous experiments have been described and copied from one text-book to another. The collection of hydrogen from the action of sodium upon water is a case in point. Many books describe, with a diagram, the "drowning" of a piece of sodium by means of a special instrument of wire gauze. This may be carried out safely in some instances, but, as Newth points out, it is liable to be dangerous. Upon one occasion in my own experience, using a small piece of sodium, an earthenware pneumatic trough was shattered as well as the gas jar used to collect the hydrogen.

It would seem desirable that writers of text-books should obtain some personal knowledge of the experiments they recommend, as young teachers, relying upon the instructions given, might easily cause very dangerous accidents. In neither of the cases cited above would a chemist, unless fairly experienced, be likely to apprehend any difficulty or danger.

E. R. MARLE.

Hartley University College, Southampton.

THE letter of Mr. Power in *NATURE* of February 3 directs attention to a danger common to the use of any of the metallic reducing agents, and, although well known to a few for many years, it is not at all generally recognised. Even the well-known reaction



if performed in the way described, is positively dangerous unless all the precaution necessary for a violent explosion be taken.

A very striking lecture experiment is to charge a tiny steel crucible that will contain about one-half up to one cubic centimetre of a mixture of ferric oxide and finely powdered aluminium, and to cover it loosely with a thin sheet-iron cover so as to preserve the contents from water vapour, and then to heat this up in a little furnace made of strong iron gauze covered with asbestos and held rigidly in a retort stand. An ordinary blow-pipe with a foot blower will be sufficient, and the reaction is so violent, as soon as the necessary temperature is attained, that in nearly every case the steel crucible will be shattered into pieces, notwithstanding the lightness of the cover.

The possibly dangerous character of the reduction was noticed by me certainly so long ago as 1896 whilst preparing special qualities of iron experimentally in the South Kensington laboratories, and shown to many persons. Even then it may have been not unknown to other workers with metals, although new to us; and although the mixture was at once respected, and absorbents of heat were used in the charge to moderate the action, I am aware of at least one narrow escape by an operator who wished to verify the observation and used a quarter of a kilogram of the mixture in a crucible heated by a Fletcher oxygen injector furnace, the pieces of which were thrown all over a large room, fortunately without striking any person.

The explanation is simply that the preliminary heating to the temperature of reaction is sufficient to enable the mixture to reach the volatilisation point of the iron by the heat suddenly evolved throughout the mass, and thus there is practically detonation; but it also suggests that some danger of explosion exists should a store of the mixture be involved in a fire, and these mixtures are now in fairly common use industrially.

HENRY C. JENKINS.

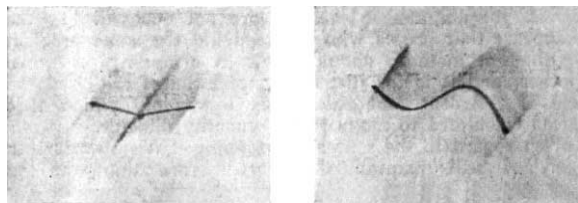
The School of Metalliferous Mining (Cornwall),
Camborne, February 5.

The Maintenance of Forced Oscillations.

PLEASE permit me to add a few words to my note on "The Maintenance of Forced Oscillations of a New Type," which appeared in *NATURE* of December 9, 1909. I stated that when a vibrating fork maintains the vibration of a string by periodically varying its tension, the stationary oscillation maintained may have a frequency of half of, equal to, $3/2$ times, twice, &c., of that of the fork, each term in the harmonic series appearing separately by itself, or with one or more of the others conjointly, according to circumstances.

When two or more of the harmonics thus appear con-

jointly, they generally are not all in one plane of vibration; in other words, one or more appear in a plane which is normal to that of the others, and this can always be secured by a manipulative device. The paths described by any point on the string would in such circumstances be curved figures identical with, or analogous to, the well-known figures of Lissajous.



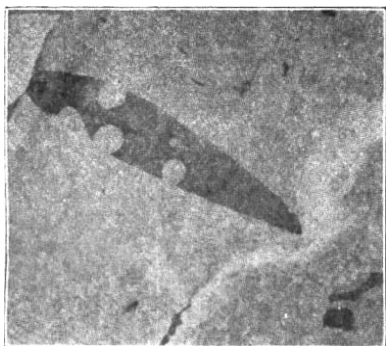
I send two photographs (Figs. 1 and 2), each only 3 cm. by 2 cm., showing a short length of the string with a brilliant point in the middle of it, when executing such oscillations. The curves shown in them are only two out of a large number that I have observed and photographed, and can be recognised to be both compounds of the first three harmonics in the series mentioned above. It is difficult at first mentally to picture the process by which a tuning-fork executing normal oscillations maintains a string permanently in an oscillation of the type shown in the photographs.

C. V. RAMAN.

Post-Box 59, Rangoon.

A Tertiary Leaf-cutting Bee.

ALTHOUGH fossil remains furnish us with abundant evidence of the antiquity of many structural characters in animals, and permit us to surmise a like antiquity of certain habits, it is not often that we find preserved the proofs of the latter. The leaf herewith figured, collected in the Miocene shales of Florissant, Colorado, by two of my students, Messrs. Duce and Rusk, shows the work of a leaf-cutting bee. Evidently the specialised and peculiar habit of cutting out pieces of leaf to use in forming the nest was as highly developed, perhaps, a million years



ago as it is to-day. The bee itself has also been obtained, and described as *Megachile praedicta*, Ckll., 1908.

T. D. A. COCKERELL.

University of Colorado, January.

Tests for Colour-blindness.

WITH reference to the article on colour-blindness in NATURE of January 27, I should like to point out that advocates of the Holmgren test assume that a person who fails with the wools will fail with coloured lights, and that a person who appears normal when examined with the wools is normal when examined with coloured lights. This was the first point which I proposed to settle when I took up the subject of colour-blindness. I found many varieties of colour-blindness, unimportant from a practical point of view, that failed, and many dangerous varieties of colour-blindness that passed this test. Many absolutely normal-sighted persons are also rejected by the Holmgren test; Germany has officially discarded it for this reason.

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Within the last fortnight I have examined two dangerous varieties of colour-blindness that passed the Holmgren test with the greatest ease; in fact, the most punctilious examiner would not have suspected that there was anything wrong with their colour sense, but both made the grossest errors with my lantern. The first case could not tell between the white, green, and red lights on trams at a distance of about one hundred yards.

The two factors which seem to be generally overlooked are the great effect of diminishing the intensity of a light in certain cases and the importance of taking into account the size of the image on the retina, that is to say, the number of cones stimulated. A few days ago I examined a normal-sighted man who had failed with the Holmgren test. He put definite browns with the green skein. When I found that he was normal I asked him to name the wools, and he did so correctly. I then asked him why he put browns with green. He replied, "I have been told I am green-blind, and I thought that there was green in those browns which I could not see." When I told him he was quite normal he had not the least difficulty with the test.

F. W. EDRIDGE-GREEN.

Hendon, January 31.

Observations of Halley's Comet.

READERS of NATURE may perhaps be interested to know that Halley's comet can now be seen with a good pair of field-glasses. Careful estimates make it almost exactly equal to an eighth-magnitude star.

The best form of instrument is a high-power Galilean binocular, and though the comet does not present any interesting features with such small optical aid, it can be distinctly seen, and distinguished from a star by its nebulous appearance. It is, of course, necessary to know the comet's position fairly exactly before attempting to pick it up. The following are a few of my notes:—

- 1910, Jan. 8, 12 and 13, Comet faintly seen in 1-inch finder
Mag. ± 9.0 .
" " 15d. 8h. 45m. Faintly seen in binocular.
" " 30d. 8h. om. Steadily seen in binocular.
" Feb. 3d. 8h. om. Found with binocular, eighth magnitude (estimate 8.1).

P. M. RYVES.

Zaragoza, Spain, February 5.

Records of the Earthquake of January 22.

DR. CHREE has noted in NATURE of February 3 the mechanical effect upon the Kew declination-magnetograph by the earthquake of January 22. Any confirmation of movements of this kind is of considerable value, and I therefore send you this notice of the corresponding effects upon the Stonyhurst magnetographs. All the three elements were markedly affected; the declination magnet was set in oscillation at 8h. 56m. a.m. for five minutes, the vertical force magnet also at 8.56 for about two minutes, and the horizontal force magnet was the most disturbed, commencing at 8.52 and lasting for quite ten minutes, with a maximum displacement of 3.5 mm. against the force of the torsion balance, but it is not clear that there was any swing on the opposite side of the normal position.

The origin of the earthquake remains apparently unknown, but, judging by our Milne seismograph, it was much nearer to us than any of the thirty earthquakes registered here since the instrument was fairly started on active service on July 1, and the proximity may account for the much greater swing of the boom. From the beginning I have claimed the eastern border of the Atlantic for the true region.

Prof. Milne's seismographs at Shide have shown an enduring displacement which has not been produced here.

WALTER SIDGREAVES.

Stonyhurst College Observatory, February 5.

The Mendel Journal.

IN NATURE for December 30, 1909 (p. 252), there appeared a review of the first number of the *Mendel Journal*, by "E. H. J. S." He also, in the same review, reviewed the current issue of *Biometrika*. I pass no comment upon the questionable fairness of having two